Calculus Name Mark Key ID: 1

Practice Quiz Chain rule / motion

Differentiate each function with respect to x.

1) $y = \cos 3x^2$

$\frac{dy}{dx} = -\sin(3x^2) \cdot 6x$ or

$-6x \sin(3x^2)$

2) $f(x) = (2x^2-3) \cdot \cos(x^4)$

$(2x^2-3)(-4 \sin(x^4)) + 4x \cos x^4$

3) $f(x) = \sec\left(\frac{4x^3}{x^2+2}\right)$

$\sec\left(\frac{4x^3}{x^2+2}\right) \tan\left(\frac{4x^3}{x^2+2}\right) \cdot \frac{(x^2+2)(12x^2) - 4x^3(2x)}{(x^2+2)^2}$

$\sec\left(\frac{4x^3}{x^2+2}\right) \tan\left(\frac{4x^3}{x^2+2}\right) \cdot$

$12x^4 - 4x^4 + 24x^2$

$\frac{8x^4+24x^2}{(x^2+2)^2}$

(4) $y = \dfrac{\cot(x^5)}{\csc(x^5)}$

$$\cot(x^5) \cdot \frac{1}{\csc x^5}$$

$$\frac{\cos x^5}{\sin x^5} \cdot \frac{\sin x^5}{1}$$

$$\cos x^5$$

$$-\sin(x^5) \cdot 5x^4$$

$$-5x^4 \sin(x^5)$$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the velocity function $v(t)$, the acceleration function $a(t)$, and the intervals of time when the particle is slowing down and speeding up. Defend your responses

5) $s(t) = t^3 - 15t^2$

$s' = 3t^2 - 30t$

$0 = 3T(T - 10)$

$T = 0$ and $T = 10$

$s'' = 6T - 30$

$0 = 6T - 30$

$5 = T$